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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,140	03/31/2004	John Michael Snyder	MSFT-2926/306875.02	9191

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EXAMINER	
REPKO, JASON MICHAEL	
ART UNIT	**PAPER NUMBER**
2628	

NOTIFICATION DATE	DELIVERY MODE
06/08/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Interview Summary	Application No.	Applicant(s)	
	10/815,140	SNYDER ET AL.	
	Examiner	Art Unit	
	Jason M. Repko	2628	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Jason M. Repko*. (3)_____.

(2) *Jason F. Lindh (applicant's representative)*. (4)_____.

Date of Interview: *16 May 2007*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1-30*.

Identification of prior art discussed: _____.

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Applicant's representative presented a set of amendments to be discussed. After an initial review, the Examiner stated the proposed amendments appeared to follow the suggestions presented in the non-final rejection by incorporating subject matter in the independent claims that was determined to be allowable*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No. 10/815,140
Filing Date ..... Mar 31, 2004
First Named Inventor ..... John Michael Snyder
Assignee ..... Microsoft Corporation
Group Art Unit 2628
Examiner ..... Jason M. Repko
Attorney's Docket No. MS1-3541US
Title ..... Systems and Methods for All-Frequency Relighting Using Spherical Harmonics and Point Light Distributions

INFORMAL COMMUNICATION IN PREPARATION FOR SCHEDULING AN INTERVIEW

To: Examiner Repko
Fax: (571) 273-8624

From: Jason F. Lindh
Lee & Hayes, PLLC
421 W. Riverside Avenue, Suite 500
Spokane, WA 99201
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(Tel. 509-324-9256; Fax 509-323-8979)

Dear Examiner Repko:

[0001] This communication provides an agenda for a phone interview of this matter. My assistant will be contacting you to schedule an interview. If you would prefer to schedule the interview, then please contact my assistant or me directly. Our contact info is on the signature page of this document. Thank you in advance to talking with me about this matter.

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Interview Agenda:

- Discussion about the Abstract
- Discussion about the Specification
- Discussion of the Drawings
- Discussion of the § 101 issues
- Discussion of the § 112, Second Paragraph, issues
- Discussion the new claims;
- Discussion of proposed amendments

The Abstract

[0002] The abstract has been objected to because the original abstract was not sufficiently clear and concise. The applicant proposes the following amended abstract:

> ~~The present invention is directed to~~ **Computer graphics** systems and methods for all-frequency relighting **are described. In one described embodiment, all-frequency relighting is achieved** by representing low frequencies of lighting with spherical harmonics and [~~approximate~~] **approximating** the residual high-frequency energy with point lights. **In another** ~~One such~~ embodiment [~~renders~~] low-frequencies **are rendered** with precomputed radiance transfer (PRT) **techniques** ~~(which requires only a moderate amount of precomputation and~~ storage~~),~~ while the higher-frequencies are rendered with on-the-fly techniques ~~such as~~ shadow maps ~~and shadow volumes~~. ~~In addition,~~ various **Further** embodiments are directed [~~to~~] **towards** a systems and methods for decomposing the lighting into harmonics and sets of point lights. ~~Various alternative embodiments are directed to systems and methods for characterizing the types of environments for~~

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~~which the described decomposition is a viable technique in terms of speed (efficiency) versus quality (realism).~~

[0003] With this amendment to the abstract, the applicant believes that the reasoning for the objection of the abstract is no longer applicable.

The Specification

[0004] The specification has been objected to because of the inclusion of the Attorney Docket number in the [0002] paragraph of the disclosure. The Applicant proposes amending the specification by replacing paragraphs [0001] and [0002] with the following.

> **[0001]** This application claims benefit of U.S. Provisional Patent Application No. 60/510,191 **[~~(Client Docket No. 306875.01)~~]**, filed on October 10, 2003, entitled "ALL FREQUENCY RELIGHTING USING SPHERICAL HARMONICS AND POINT LIGHT DISTRIBUTION," the contents of which are hereby incorporated herein by reference in their entirety.
>
> **[0002]** This application is related by subject matter to the inventions disclosed in the following commonly assigned applications, the entire contents of which are hereby incorporated herein by reference: U.S. Patent Application No. 10/815,141 **[~~(not yet assigned) (Atty. Docket No. MSFT-2901/306874.02)~~]**, filed on even date herewith, entitled "SYSTEMS AND METHODS FOR ROBUST SAMPLING FOR REAL-TIME RELIGHTING OF OBJECTS IN NATURAL LIGHTING ENVIRONMENTS."

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[0005] With these proposed amendment to the specification, the applicant believes that the objection to the specification would no longer be applicable.

The Drawings

[0006] The drawings, specifically figure 1, has been objected to as failing to comply with 37 C.F.R. § 1.84(p)(5) because the figure includes a reference character 36' which is not mentioned in the description. The applicant proposes amending the drawings by replacing the reference character 36' with the reference character 36. The applicant believes that this proposed amendment to the drawing would be sufficient to overcome the objection.

The 35 U.S.C. § 101 Rejection

[0007] Claims 1-9 have been rejected as being directed to a process consisting solely of operation manipulating a set of mathematical entities. Claims 1 has been amended to include the element that the method is a method for "displaying all-frequency relighting of computer-generated graphic objects" and that the method includes "displaying the computer graphic objects". The Applicant believes that this amendment addresses the concerns of the Examiner, and that further the amended claim now claims subject matter capable of producing a useful, concrete and tangible result. Please see the attached appendix with the complete list of amendments to each of the claims.

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[0008] Claims 10-18 and 28-30 have been rejected as being directed to encompass a computer program not technologically embodied to enable the functionality to be realized. The applicant proposes amending paragraph [0018] of the specification in the following manner:

> **[0003]** While it is envisioned that numerous embodiments of the present invention are particularly well-suited for computerized systems, nothing in this document is intended to limit the invention to such embodiments. On the contrary, as used herein the term "computer system" is intended to encompass any and all devices capable of storing and processing information and/or capable of using the stored information to control the behavior or execution of the device itself, regardless of whether such devices are electronic or mechanical[~~, logical, or virtual in nature~~].

[0009] The applicant believes that this proposed amendment to the specification would be sufficient to overcome the rejection of claims 10-18 and 28-30. Additionally, claims 10 and 28 have been amended to include elements that clarify that the claims claim patent eligible subject matter that is capable of producing a useful, concrete and tangible result.

[0010] Claims 19-27 have been rejected for reciting a computer-readable medium comprising computer-readable instructions that includes non-functional descriptive material encoded on a computer readable medium. Claim 19 has been amended to claim, per the suggestion of the Examiner, that the computer-readable instructions are stored on the computer-readable medium. Claim 19 is now in proper form for allowance.

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The 35 U.S.C § 112, second paragraph

[0011] Claims 7-9 and 25-27 have been rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claims 7-9 and 25-27 have been canceled and incorporated into their respective independent claims, thus the § 112, second paragraph, at moot.

New Claims

[0012] Claims 31-45 are proposed new claims. Claims 31 is similar in scope to independent claim 1 that incorporates the elements of canceled claim 8 instead of claim 7. Claim 36 is similar in scope to independent claim 10 that incorporates the elements of canceled claim 17. Claim 41 is similar in scope to that of independent claim 19 that incorporates the element of canceled claim 26. As the Examiner has indicated that these dependent claims would be allowable if written in independent form, the applicant respectfully suggests that these claims are now in proper form for allowance.

Proposed Amendments

[0013] Each of the proposed amended independent claims include subject matter that the Examiner has indicated to be allowable if the § 101 issues were addressed.

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Conclusion

[0014] Once again, thank you for taking the time to talk with me. I look forward to talking to you.

Respectfully Submitted,

Jason F. Lindh
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Appendix of Claims with Proposed Amendments

What is Claimed:

1. (Currently Amended) A method for **displaying** all-frequency relighting **of computer-generated graphic objects, comprising:**

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques; **[~~and wherein~~ a]**

representing a set of low frequencies of lighting **[~~are represented~~]** with a tabulated rendering method; **[~~and~~]**

approximating high-frequency energy **[~~is approximated~~]** with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on high-frequency energy reduction;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

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2. **(Original)** The method of claim 1 wherein a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

3. **(Original)** The method of claim 0 wherein a set of low frequencies of lighting is rendered using a spherical harmonics technique.

4. **(Original)** The method of claim 0 wherein a set of high frequencies of lighting is rendered using a shadow map technique.

5. **(Original)** The method of claim 0 wherein a set of high frequencies of lighting is rendered using a shadow volumes technique.

6. **(Canceled)**

7. **(Canceled)**

8. **(Canceled)**

9. **(Canceled)**

10. **(Currently Amended)** A system for **displaying** all-frequency relighting **of computer-generated graphic objects,** comprising:

a subsystem for determining approximations based on an radiance accumulation derived from a combination of at least two real-time techniques [~~comprising:~~];

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a subsystem for representing a set of low frequencies of lighting with a tabulated rendering method; **[~~and~~]**

a subsystem for approximating high-frequency energy using an on-the-fly method;

a subsystem for segmenting a lighting environment into a plurality of regions;

a subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources utilizes a high-frequency energy reduction technique;

a subsystem for allocating one or more point samples to each of said plurality of regions; and

a subsystem for displaying the computer-generated graphic objects.

11. (Original) The system of claim 10 further comprising a subsystem for representing a set of low frequencies of lighting with precomputed radiance transfer (PRT) and a subsystem for approximating high-frequency energy with a plurality of point lights.

12. (Original) The system of claim 11 further comprising a subsystem using a spherical harmonics technique to render a set of low frequencies of lighting.

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13. **(Original)** The system of claim 11 further comprising a subsystem using a shadow map technique to render a set of high frequencies of lighting.

14. **(Original)** The system of claim 11 further comprising a subsystem using a shadow volumes technique to render a set of high frequencies of lighting.

15. **(Canceled)**

16. **(Canceled)**

17. **(Canceled)**

18. **(Canceled)**

19. **(Currently Amended)** A computer-readable medium **storing** **[~~com~~prising]** computer-readable instructions for **displaying** all-frequency relighting **of computer-generated graphic objects,** **[~~using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques,~~]** said computer readable instructions comprising instructions for:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method; **[~~and~~]**

approximating high-frequency energy with an on-the-fly method;

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segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, whereby said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on high-frequency energy reduction;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

20. (Original) The computer-readable instructions of claim 19 further comprising instructions whereby a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

21. (Original) The computer-readable instructions of claim 20 further comprising instructions whereby a set of low frequencies of lighting is rendered using a spherical harmonics technique.

22. (Original) The computer-readable instructions of claim 20 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow map technique.

23. (Original) The computer-readable instructions of claim 20 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow volumes technique.

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24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Currently Amended) A hardware control device for **displaying** all-frequency relighting **of computer-generated graphic objects** using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques, said device comprising:

means by which a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights;

means by which a set of high frequencies of lighting is rendered using one of a set of techniques, said set of techniques comprising: a shadow map technique, and a shadow volumes technique

means for segmenting a lighting environment into a plurality of strata regions;

means for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said means for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises means employing a technique based on one of the following sets of

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techniques: a high-frequency energy reduction technique or an iterative algorithm for a background estimation technique;

means for allocating one or more point samples to each of said plurality of regions; and

means for displaying the computer-generated graphic objects.

29. (Canceled)

30. (Canceled)

31. (New) A method for displaying all-frequency relighting of computer-generated graphic objects, comprising:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method;

approximating high-frequency energy with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on an iterative algorithm for a background estimation;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

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32. **(New)** The method of claim 31 wherein a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

33. **(New)** The method of claim 32 wherein a set of low frequencies of lighting is rendered using a spherical harmonics technique.

34. **(New)** The method of claim 32 wherein a set of high frequencies of lighting is rendered using a shadow map technique.

35. **(New)** The method of claim 32 wherein a set of high frequencies of lighting is rendered using a shadow volumes technique.

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36. (New) A system for displaying all-frequency relighting of computer-generated graphic objects, comprising:

a subsystem for determining approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

a subsystem for representing a set of low frequencies of lighting with a tabulated rendering method;

a subsystem for approximating high-frequency energy using an on-the-fly method;

a subsystem for segmenting a lighting environment into a plurality of regions;

a subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources utilizes an iterative algorithm for a background estimation technique;

a subsystem for allocating one or more point samples to each of said plurality of regions; and

a subsystem for displaying the computer-generated graphic objects.

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37. (New) The system of claim 36 further comprising a subsystem for representing a set of low frequencies of lighting with precomputed radiance transfer (PRT) and a subsystem for approximating high-frequency energy with a plurality of point lights.

38. (New) The system of claim 37 further comprising a subsystem using a spherical harmonics technique to render a set of low frequencies of lighting.

39. (New) The system of claim 37 further comprising a subsystem using a shadow map technique to render a set of high frequencies of lighting.

40. (New) The system of claim 37 further comprising a subsystem using a shadow volumes technique to render a set of high frequencies of lighting.

41. (New) A computer-readable medium storing computer-readable instructions for displaying all-frequency relighting of computer-generated graphic objects, said computer readable instructions comprising instructions for:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method;

approximating high-frequency energy with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

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prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, whereby said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on an iterative algorithm for a background estimation;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

42. (New) The computer-readable instructions of claim 41 further comprising instructions whereby a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

43. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of low frequencies of lighting is rendered using a spherical harmonics technique.

44. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow map technique.

45. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow volumes technique.